SECTION 02512

SITE WATER DISTRIBUTION

****

LANL MASTER CONSTRUCTION SPECIFICATION

When editing to suit project, author shall add job-specific requirements and delete only those portions that in no way apply to the activity (e.g., a component that does not apply). To seek a variance from applicable requirements, contact the Engineering Standards Manual (ESM) Civil POC.

When assembling a specification package, include applicable specifications from all Divisions, especially Division 1, General Requirements.

Delete information within "stars" during editing.

Specification developed for ML-3 / ML –4 projects. For ML-1 / ML-2, additional requirements and QA reviews are required.

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PART 1 GENERAL

1.1 SECTION INCLUDES

A. Site water distribution piping system (potable and fire water) beyond the building wall.

1.2 LANL PERFORMED WORK

A. LANL's Support Services Subcontractor will perform final tie-in into existing water piping systems.

1.3 SUBMITTALS

A. Submit the following in accordance with Section 01330, Submittal Procedures:

1. Catalog data on pipe materials, pipe fittings, valves, and accessories and directional drilling pull (weak link) device and casing seals.

2. Installation instructions for valves and accessories.

3. Existing system pressure calculations to support new water pipe design and selections.

4. Certification of welders and qualified welding procedure per LANL Welding Program (ESM Chapter 13).

5. Submittals for the Horizontal Direction Drilling.

1.4 QUALITY ASSURANCE

A. Welders Certifications and Qualified Procedure Standards

1. Plastic Pipe: ASTM D2657 and ASTM D3261 and pipe manufacturers heat fusion qualification guide. Training in the making of heat fusion joints shall be per the manufacturers recommended procedure.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

A. Alternate products may be accepted; follow Section 01630, Product Options and Substitutions.

2.2 WATER BEYOND BUILDING WALL

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Consult with the LANL Utilities Group water system representative for approval when selecting buried piping beyond the building wall and under roads. **Provide permanent buildings with a minimum pipe size of 4 inches for potable water supply line**.

AWWA C151 Available Pipe Size: 4-64 inches.

Designer shall account for the diminished interior diameter of polyethylene pipe when designing for facility volume and velocity requirements.
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A. Ductile Iron Pipe: AWWA C151.

1. Joints: Bell and spigot, AWWA C111 rubber gaskets.

2. Fittings: AWWA C110, Ductile-Iron or Gray-Iron, Class 350 or AWWA C153, Ductile-Iron Compact Fittings, Class 350.

3. Pipe and Fittings: Cement mortar lined with bituminous outside coating.

B. Copper Tubing: ASTM B88, Type K, hard drawn or annealed.

1. Joints: AWS A5.8, BCuP silver braze.

2. Fittings: ANSI/ASME B16.22, wrought copper and copper alloy solder-joint.

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AWWA C900 Available Pipe Size: 4-12 inches. Provide minimum pressure rating of 150. Use ductile iron if pressure rating is greater than 200 or pipeline is routed too close to an active steam line. See minimum utility line clearances in ESM Civil Chapter.

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C. PVC Pipe: AWWA C900, [DR18, pressure rating 150] [DR14, pressure rating 200].

1. Joints: Bell and spigot, AWWA C111 rubber gaskets.

2. Fittings: AWWA C110, Ductile-Iron or Gray-Iron, Class 350 or AWWA C153, Ductile-Iron Compact Fittings, Class 350.

D. Polyethylene Pipe and Fittings: AWWA C901 (3 inch or less) and AWWA C906 and ASTM F714 (4 inch to 63 inch), [Class 150, pressure rating 150] [Class 200, pressure rating 200].

1. Manufacturer: CP Chem Performance Pipe - Driscoplex 1600, Ductile Iron Pipe Size.

2. Pipe: Polyethylene, high density, AWWA (C901), (C906), PPI-PE3408, cell classification number PE 345464C per ASTM D3350. Certifications by Factory Mutual Approvals (FMA) and National Sanitation Foundation (NSF).

3. Fittings: Polyethylene, high density, AWWA (C901), (C906), ASTM D3261, PPI-PE3408, cell classification number PE 345464C per ASTM D3350. Certifications by Factory Mutual System approvals (FM) and National Sanitation Foundation (NSF). The pipe manufacturer shall supply fittings and adapters.

4. Joints: Heat fusion per ASTM D2657 and manufacturer's written instruction.

2.3 FLANGES, UNIONS, AND COUPLINGS

A. Copper Tubing:

1. Class 150 bronze unions with soldered joints.

B. Mechanical or Push-On Type Pipe, and Fittings Below Grade.

1. UL listed or FM approved.

2. Megalug malleable iron retainer/restraint gland with epoxy or bituminous outside coating and 1/2 inch minimum diameter asphalt coated tie rods.

3. For PVC, use a compression connection and restraint system, Mueller AquaGrip System.

C. High Density Polyethylene

1. Flanges: Flanged joints shall be standard manufacturers flange adaptor that is butt fused to the pipe. Backup ring shall be ductile iron. Flange gaskets shall be installed.

2. Transitions: MJ Adaptors shall be standard manufacturers adaptor that is butt fused to the pipe for connecting to mechanical joint pipe, fittings, and appurtenances. Manufacturers' complete assembly shall be supplied; including stainless steel stiffener, extended gland bolts and nuts, gland and gasket.

2.4 VALVES, ABOVE GRADE

A. Ball Valves up to 2 inches:

1. Manufacturer: Nibco, Series 585-70.

2. MSS SP-110, 600 psi CWP, bronze, two piece body, chrome plated brass ball, full port, teflon seats and stuffing box ring, blowout proof stem, lever handle, solder or threaded ends.

B. Butterfly Valves over 2 inches:

1. Manufacturer: Nibco, Series LD 2000.

2. MSS SP-67, 200 psi CWP, ductile iron body, aluminum bronze disc, resilient replaceable EPDM seat, lug style, extended neck, lever handle, for use between ANSI Class 125/150 flanges.

C. Globe Valves up to 2 inches:

1. Manufacturer: Nibco, Series 211.

2. MSS SP-80, Class 125 bronze body, bronze trim, hand wheel, bronze disc, solder or threaded ends.

D. Gate Valves up to 2 inches:

1. Manufacturer: Nibco, Series 111.

2. MSS SP-80, Class 125 bronze body, bronze trim, rising stem, hand wheel, inside screw, solid wedge disc, solders or threaded ends.

2.5 VALVES, BELOW GRADE

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Comply with Civil Standard Drawings, ST-G3010-2 and ST-G3010-3 for below grade shut-off valve piping details.
****

A. Gate Valves up to 2 inches:

1. Manufacturer: Nibco, Series T174.

2. MSS SP-80, Class 300 bronze body, bronze trim, rising stem, hand wheel, inside screw, solid wedge disc, threaded ends.

B. Gate Valves over 2 inches:

1. Manufacturer: Mueller, No. A-2360-20 or A-2361-77 AquaGrip, No Substitution.

2. AWWA C509, UL listed or FM approved, Class 250, non-rising stem, open left, mechanical joint inlet and outlet with mechanical joint unassembled accessories or Mueller AquaGrip System.

C. Tapping Valves:

1. Manufacturer: Mueller, No. T-2360-16, No substitution.

2. AWWA C509, UL listed or FM approved, Class 250, resilient wedge, non-rising stem, open left, ANSI Class 125/150 inlet flange, mechanical joint outlet with mechanical joint accessories.

D. Gate Valve (Post Indicator):

1. Manufacturer: Mueller, No. P-2360-20 or P-2361-77 AquaGrip, No Substitution.

2. AWWA C509, UL listed or FM approved, Class 250, non-rising stem with post indicator flange, open left, mechanical joint inlet and outlet with mechanical joint accessories or Mueller AquaGrip System.

2.6 WATER PRESSURE REDUCING VALVES (PRV)

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Install PRV(s) in appropriately sized concrete vaults allowing full access for maintenance. A LANL Utilities Group water system representative shall approve design and installation of site PRVs and required PRV optional features. Comply with the ESM Mechanical Chapter for building PRVs.
****

A. Manufacturer: CLA-VAL, No. 90-01, No Substitution.

B. Single seated, hydraulically operated, pilot controlled, diaphragm type valve, 175 psi pressure rating, 180 degree F maximum water temperature and 15 to 75 psi adjustment range. Pilot control; direct acting, adjustable, spring loaded, and normally open. Valve construction; globe, ductile iron main valve body and cover, bronze main valve trim, and cast bronze pilot control with stainless steel trim. Repairs must be done without removing valve from line.

1. Optional Features: [ ].

C. Capacity/Size:

1. Flow: [ ] gpm.

2. Size: [ ] inches with female NPT union ends or ANSI Class 150 flanged ends.

2.7 WATER PRESSURE REDUCING VALVE (PRV)

A. Manufacturer: CLA-VAL, No. 90-48, Low Flow Bypass, No Substitution.

B. Single seated, hydraulically operated, pilot controlled, diaphragm type valve, 175 psi pressure rating, 180 degree F maximum water temperature and 15 to 75 psi adjustment range. Pilot control; direct acting, adjustable, spring loaded, and normally open. Valve construction; globe, ductile iron main valve body and cover, bronze main valve trim, and cast bronze pilot control with stainless steel trim. Repairs must be done without removing valve from line.

1. Optional Features: [ ].

C. Capacity/Size:

1. Flow: [ ] gpm.

2. Size: [ ] inches with ANSI Class 150 flanged ends.

2.8 WATER PRESSURE REDUCING VALVE (PRV)

A. Manufacturers:

1. CLA-VAL, No. 990

2. Watts Regulator Company, No. 25AUB or No. U5B.

B. Balanced single seat with bronze valve body and cover, stainless steel trim, integral strainer, 175 psi maximum water pressure, and standard adjustment range 8-80 psi. Repairs must be done without removing valve from line.

C. Capacity/Size:

1. Flow: [ ] gpm.

2. Size: [ ] inches with NPT union ends.

2.9 FIRE HYDRANTS

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Comply with Civil Standard Drawings ST-G3010-4 for fire hydrant piping detail.
****

A. Manufacturer: Mueller, Super Centurion 250, Style A423. No Substitution.

B. UL listed or FM approved, dry barrel, 5 1/4 inch main valve opening, 3-way with 4 1/2 inch pumper nozzle and two 2 1/2 inch hose nozzles, ground level break flange, and mechanical joint inlet connection or Mueller AquaGrip System. Hydrant factory painted yellow.

2.10 POST INDICATORS

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Comply with Civil Standard Drawings ST-G3010-3 for PIV piping detail.

****

A. Manufacturer: Mueller, No. A20806. No Substitution.

B. UL listed or FM approved, adjustable type, open left, complete with lower barrel sized for appropriate bury depth.

2.11 BACKFLOW PREVENTER, THREADED ENDS (SIZES UP TO 2 INCHES)

****

A LANL Utilities Group water system representative shall approve design and installation of backflow preventers installed outside the building. Do not install backflow preventer below grade.

****

A. Manufacturer: FEBCO Model 860U or models listed in the latest edition of Approved Backflow Prevention Assemblies by the University of Southern California Foundation for Cross Connection Control and Hydraulic Research.

B. Assembly, reduced-pressure, bronze body, with ball-type shut-off valves, FNPT ends, test cocks for in-line field testing, integral unions between body and shut-off valves, water temperature range 33 to 140 degrees F, rated working pressure 175 psi, meeting AWWA C511 and ASSE 1013. Provide matching air gap drain.

1. Size: [ ] inch.

2.12 BACKFLOW PREVENTER, FLANGED ENDS (2 ½ INCHES AND LARGER)

A. Manufacturer: FEBCO Model 860 or models listed in the latest edition of Approved Backflow Prevention Assemblies by the University of Southern California Foundation for Cross Connection Control And Hydraulic Research.

B. Assembly, reduced-pressure, ductile or cast iron body epoxy coated internal and external, with UL approved OS & Y resilient wedge gate shut-off valves, flanged ends, test cocks for in-line field testing. Water temperature range 33 to 140 degrees F, working pressure 175 psi, meeting AWWA C511 and ASSE 1013. Provide matching air gap drain.

1. Size: [ ] inch.

2.13 PRESSURE GAUGE

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Refer to manufacturer's recommendation for gauge pressure ranges. Generally, a pressure range of twice the working pressure is recommended, with maximum working pressure not exceeding 75 percent of the range. If pulsation occurs, working pressure should not exceed 65 percent of the pressure range.

****

A. Manufacturer: Reotemp Instruments.

B. ANSI B40.1, Grade A, 1 percent full scale accuracy, minimum 2 1/2 inch dial, phenolic or steel case, phosphor bronze bourdon tube and 1/4 inch NPT brass bottom connection. Furnish with brass ball valve

1. Range: [ ] psi or [See drawings]

2.14 SERVICE SADDLE

****
A LANL Utilities Group water system representative shall approve the design and installation of proposed taps on asbestos-cement water lines. Asbestos-cement lines cannot be tapped directly, portion of main line will be replaced by SSS.
****

A. Manufacturer: Mueller, DR1A & S Series and DR2A & S Series for A-C and plastic.

B. Ductile iron, stainless steel strap, iron pipe outlet thread, and o-ring gasket.

C. Strap shape to be per manufacture recommendation for the existing pipe material.

2.15 TAPPING SLEEVE

****
A LANL Utilities Group water system representative shall approve the design and installation of proposed taps on asbestos-cement water lines. Asbestos-cement lines cannot be tapped directly, portion of main line will be replaced by SSS.
****

A. Manufacturer: Romac Industries, No. FTS 419, No Substitution.

B. Fabricated steel, ANSI Class 150 outlet flange, suitable for PVC, steel, ductile iron, and cast iron pipe, outlet flange size and sleeve O.D. to suit piping system.

2.16 COUPLING

A. Manufacturer: Dresser, Style 38 for steel pipe, and style 138 for cast iron pipe.

B. Steel, size suitable for pipeline material and diameter.

2.17 VALVE BOX

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Comply with Civil Standard Drawing ST-G3010-1 for valve box detail.
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A. Manufacturer: Tyler, Series 6860.

B. Cast iron, 5 1/4 inch shaft, screw type, lid marked “water”.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not install underground piping when bedding is wet or frozen.

B. Verify that excavations are to required grade.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs.

B. Remove scale and dirt on inside and outside of piping before assembly.

C. Keep open ends of pipe free from scale and dirt. Whenever work is suspended during construction, or at the end of each workday, protect open ends with temporary plugs or caps.

3.3 PIPING TIE-IN

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Refer to Civil Standard Drawings ST-G3010-2 for water piping tie-in details.
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A. Tie-in to existing piping systems will be performed by LANL's Support Services Subcontractor (SSS). Excavation, backfill, and materials required for tie-in shall be provided by Contractor. The tie-in will be inspected by the LANL Construction Inspector and the LANL Utilities Group water system representative.

B. Notify LANL Construction Inspector at least 10 working days in advance to schedule tie-in. The LANL Construction Inspector will notify LANL's SSS.

C. Prior to notifying SSS, the LANL Construction Inspector will ensure materials required for tie-in are on site, service lines have been tested, material submittals and all test reports have been approved by LANL Utilities Group, and bell hole is dug.

3.4 BURIED PIPING

****
Tracer wire and test stations are required when specifying cast iron, ductile iron, and non-metallic piping. Comply with Civil Standard Drawings ST-G30GEN-3 for tracer wire/test station details and ST-G30GEN-4 for trenching detail.

Refer to the LANL Engineering Standards Manual, Civil Chapter, Section G30 (future), for required minimum utility line clearances.

Refer to Civil Standard Drawing ST-G30GEN-4 for trench width and piping burial depth.
****

A. Refer to Drawings and Section 02310, Grading, Excavating, and Trenching, for earth cover, bedding, tracer wire, wire continuity test, warning tape, documenting new or exposed existing utility location, etc., requirements.

3.5 INSTALLATION

A. Comply with Uniform Plumbing Code (IAMPO) and applicable AWWA publications.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Route piping in a straight line, in an orderly manner, and maintain gradient.

D. Set hydrants plumb and locate pumper nozzle perpendicular to and facing roadway.

E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

F. Sleeve and caulk pipes penetrating exterior walls below grade to provide a waterproof installation.

****
Disinfecting solutions containing chlorine shall not exceed 12% active chlorine, greater concentrations can chemically attack and degrade polyethylene.
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G. Disinfect water distribution system in accordance with Section 15141.

H. Pressure test piping system in accordance with Section 15992.

****
Consult with a LANL Fire Protection Group representative and a LANL Utilities Group water system representative for sites with dedicated non-potable water fire lines.
****

I. Fire hydrants tied into a non-potable dedicated fire loop shall have the hydrant bonnet painted black, and labeled “Non-Potable Water, Do Not Drink” in accordance with Section 15075, Mechanical Identification. Refer to Drawings for hydrant location.

J. Comply with AWWA M23, PVC Pipe Design Installation, for installation of PVC piping under roads.

3.6 POLYETHYLENE PIPING INSTALLATION

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Use metallic pipe if water line is installed less than 20 feet from steam and condensate lines.
****

A. Lay coiled and small diameter piping on trench bottom in such a manner as to snake piping (“S” curves) in trench along the piping run. This will insure that sufficient piping material is available for expansion and contraction. Lay piping in trench and allow for temperature stabilization to minimize thermal expansion and contraction.

B. Cold (field) bending allowable bend radius is determined by pipe diameter and dimension ratio. Minimum bend radius shall be per manufacturers written instructions. Bends shall not be made where fittings are in the bend.

C. Provide minimum of 5 feet of cover over piping installed under any roadways and vehicle parking areas.

D. Perform butt heat-fusion joining in accordance with ASTM D2657 and the manufacturer's written instructions. See PART 1, Quality Assurance.

E. Make connections to PE-to-DI or PVC pipe and mechanical connections, valves, and appurtenances with transition fittings that are butt fused onto the PE pipe. Provide complete assemblies and install per manufacturers written instruction.

F. Thrust blocks and restraint shall be installed at tees and change in direction per the manufacturer's written instructions.

3.7 Horizontal Directional Drilling or Pipe Bursting

A. Crossing of paved streets or roadways or other areas, if approved by LANL Utilities group representative, may be accomplished by horizontal directional drilling (HDD) or pipe bursting, whenever practical. The HDD bore shall be kept to a maximum of 2 inches larger than the pipe. Care shall be exercised to ensure the paved surface is not damaged during the drilling operation.

B. Top of HDD shall have a minimum below grade bury depth of 48 inches and a minimum bury depth of 60 inches below any paved surface. Depth shall not exceed excavation by standard, conventional means and shall be approved by LANL Utilities group representative.

C. When pulling in pipe the pulling force shall be monitored and kept below the Allowable Tensile Load (ATL) value of the pipe size and material per manufacturers recommendation. Both pipe ends shall be monitored for continuous, smooth movement. Pulling load from the equipment shall be monitored and the pipe lead end shall be equipped with a weak link device to disengage at the ATL or below. Manufacturers procedures and design parameters shall be followed, in addition to ASTM F1962.

D. Polyethylene pipe shall extend 3-5% of the pulled-in length past the termination points to allow for contraction. Polyethylene pipe shall be allowed 24 hours to recover from the pulling stress and contract to original pre-pull length and allowed to stabilize to buried soil temperature before final tie-ins are accomplished. A minimum of five (5) feet of pipe shall extend beyond the drilling entrance/exit hole to allow for pipe damage assessment. Tracing wire shall be pulled in with the polyethylene pipe.

END OF SECTION

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Do not delete the following reference information:

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FOR LANL USE ONLY

This project specification is based on LANL Master Construction Specification Rev. 6, dated November 24, 2004.